

Maximising the Opportunity for Healthy Ageing: Online Mental Health Measurement and Targeted Interventions

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Abstract. Longevity is a valuable resource for society, as older people are increasingly looking for new ways to contribute after retirement. Their contribution is however dependent upon their physical health, mental health and wellbeing. The potential role that mental health and wellbeing, two separate but interrelated constructs, play often are both under-recognised and insufficiently targeted. Positive ageing is a positive and constructive view of ageing, where older people actively work on maintaining a positive attitude, work towards keeping fit and healthy, and strive to maximize their wellbeing. Interventions stimulating positive ageing show promising results for both mental health and wellbeing, and telehealth can play an important role in improving the reach and effectiveness of positive ageing interventions. Telehealth solutions can also help researchers reliably measure and better understand the drivers of wellbeing at individual and population levels; results that can both form the basis for advancing the field of positive ageing and help inform public policy.

Keywords. Healthy ageing, wellbeing, complete mental health, longevity, complete state model of mental health, telehealth, mental health reform, positive ageing.

1. Introduction

1.1. *The Opportunity of Longevity*

For the first time in history average life expectancy across the globe exceeds 60 years [1]. In less developed countries this increased longevity is largely the product of reduced infant mortality and targeted public health interventions, as well as improvements in nutrition [2]. Brazil is a shining example, where a child can now expect to live 20 years longer than one born just 50 years ago [3, 4]. In contrast, increased longevity in high-income nations is mainly attributed to the rising life expectancy of those aged 60 years and older [5]. For example, from 1998 to 2012 the life expectancy of Australians aged 65 years old increased by 3 years (from 81.1 to 84.1 years in males, from 84.8 to 87.0

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years in females) [6]; changes that have largely been driven by improvements in various medical treatments [7].

When taken together with a reduction in fertility rates, predominantly witnessed in the developed world, improved longevity is often associated with concern regarding societal and economic impacts of a globally ageing population [8-10]. While the implications of improved longevity hold serious implications for our current society and economy, improved longevity represents the international success of governments, medical, and public health systems, with nations preparing for, and coping with, the added pressures of an ageing population [9]. More importantly however, societies can significantly benefit from an increasing aged population with a shift in viewpoint from seeing people aged 65+ as a burden to seeing them as a resource and blessing, and with innovating the public health approach to facilitate this new and more positive view [11].

1.2. Healthy Ageing

Longer life can be an incredibly valuable resource for society. Older people in high-income countries, such as Australia, look to spend those extra years in creative ways with new careers, continuing education, or pursuing a neglected or new passion [12, 13]. However, the opportunities created by the longevity of older people rely heavily on their health and independence; if the older years are dominated by declines in physical and mental capacity, and increased morbidity, the implications for older people and for society are more negative [3]. Fortunately, in Australia, improved longevity has also been associated with increasing numbers of years free from disability and severe or profound core activity limitation [6].

This notion of ageing in good health to ensure that an older person can keep contributing to society is often referred to as ‘healthy ageing’. In this chapter healthy ageing is defined in line with the World Health Organisation definition [14] that states that healthy ageing is related to “developing and maintaining the functional ability of an individual that enables wellbeing in older age”, where ‘functional ability’ refers to the combination of the intrinsic capacity of a person, the characteristics of their environment, and the interaction between the person and their environment, and ‘intrinsic capacity’ refers to the metric which incorporates the combination of an individual’s physical and mental (including psychosocial) capacities.

While not being the only contributor, intrinsic capacity nonetheless plays an important role in ageing [3]. At a population level, the trajectory of intrinsic capacity appears to decline gradually with age, while at an individual level, trajectories are likely characterised by irregular setbacks and recoveries. Healthy ageing aims to create environments where individuals can maximize their intrinsic capacity, receive appropriate care and support in these times of setbacks, to enhance their recovery and prevent avoidable decline. Key areas of action of healthy ageing include aligning health systems to the needs of older adults, developing systems that can provide long-term care, ensuring an age-friendly environment, improving measurement, monitoring, and understanding of ageing, and targeting factors that influence intrinsic capacity directly.

A range of factors influence older adults’ intrinsic capacity and functional status as they age [15, 16]. As examples, specific risk factors for older Australians include insufficient fruit and vegetable intake, and being overweight or obese [10]. While detrimental to intrinsic capacity, these ‘physical’ risk factors are often acknowledged, treated and resourced by health professionals and the healthcare sector. Unfortunately,

this approach to physical risk factors is less the case for mental illness and low wellbeing in this population [17, 18], despite their profound potential impact on intrinsic capacity.

In this paper, we describe the impact that wellbeing measurement and interventions, enabled by telehealth, could have on the mental health and healthy ageing of older adults around the world.

2. Mental Illness in Older People

2.1. The Burden of Mental Illness on Older Adults

The global burden of mental illness is considerable. Recently, Vigo, Thornicraft, and Atun argued that the burden has traditionally been underestimated and re-calculated the burden of mental illness using more appropriate designs [19]. Their study found that mental illness represents one of the greatest burdens to global health, is the largest contributor to years lived with disability (YLD), and the equal largest influence on disability-adjusted life-years (DALYs) at similar rates to cardiovascular disease [20]. However, in contrast to substantial improvements in cardiovascular morbidity and mortality [21, 22], the rates of death and disability caused by mental illness continue to rise [23]. In addition to health implications, mental illness is also projected to have the greatest impact on global economic output of all non-communicable diseases [2].

Mental illness is a particular challenge to healthy ageing and quality of life of older adults. There are large numbers of older people living at home with a variety of mental health problems, who need specialised treatment and support to enable them to enjoy the best possible quality of life [20]. Globally, over 20% of adults aged 60 and over live with a mental illness, with depression being the most commonly experienced illness [24]. Around one quarter of deaths resulting from self-harm are among those aged 60 years and above [24]. Similarly, globally 15% to 52% of older people report anxiety symptoms; an often overlooked problem in this cohort [25]. In an Australian study, symptoms of depression were evident in 45% of older adults entering aged-care for the first time, and in 52% of permanent aged-care residents [10].

While prevalent, several problems can be noted when it comes down to practical treatment and policy on mental illness in this population. In practice, mental health problems are under-identified by health care professionals and for older adults themselves, as the stigma that continues to surround mental illness makes them reluctant to seek help [20, 26]. At a policy level it can be seen that mental health policies and strategies focus on the mental health of adult populations below the retirement age, and do not adequately take into account the needs of older adults [20]. Recently, Oster et al. (2016) evaluated the conceptualisations and discourse regarding older Australians and ageing in Australian mental health policy documents [27]. They found that ageing is often presented as a time of decline and dependence, and older adults are often represented as being at-risk, reliant on family and friends, and having mobility difficulties [27]. South Australia was the only state to include discourse on 'Healthy Ageing', which reflects concerted government efforts to improve the mental health and wellbeing in the state [27-30]. This positive view on ageing in South Australia is exemplified by the "State of Wellbeing Statement" and the creation of The Wellbeing and Resilience Centre (WRC), situated within the South Australian Health and Medical Research Institute (SAHMRI), that aims to achieve population-level increases in

wellbeing by taking a whole-state approach to measure and build the wellbeing of its citizens [30, 31].

3. The Role of Wellbeing in Healthy Ageing

3.1. Wellbeing and Ageing

Wellbeing is an outcome drawing increased attention and research as an important construct for older adults' physical, psychological and emotional health, or intrinsic capacity [32]. The WRC has adopted Seligman's PERMA model of wellbeing [33], which is based on a dashboard of five domain indicators of wellbeing; (P)ositive emotion, such as gratitude and hope; (E)ngagement in tasks that challenge individual strengths and produce 'flow'; positive (R)elationships, such as those with family, friends and colleagues; (M)eaning derived from being a part of, and contributing to, something greater than that possible as an individual; and (A)ccomplishment of rewarding tasks [28, 34]. The WRC compliments this model with "PLUS-elements" (physical activity, nutrition, sleep and optimism), after consultation with experts in wellbeing, to reflect a holistic account of wellbeing and health.

As the new field of positive psychology has been developing [35], one area that has been a focus has been 'positive aging' [36]. The Australian Psychological Society (APS) defines positive ageing as "the process of maintaining a positive attitude, feeling good about yourself, keeping fit and healthy, and engaging fully in life as you age" [37]. Positive aging is a positive and constructive view of growing older which accepts aging as continuous and normal development which occurs in human life [38].

Numerous studies have found that wellbeing increases with age [39, 40], and the impetus has been to untangle what types of wellbeing increase, when, why, and for whom. For example, throughout the United States adults aged 55 and older have higher wellbeing than the rest of the American population [41]. Specific components of wellbeing (e.g. life satisfaction, happiness) are also differently associated with aging. For example, life satisfaction changes over the lifespan. Two large-scale, nationally representative panel studies (the German Socio Economic Panel Study with approximately 40,000 participants, and the British Household Panel Study with approximately 20,000 participants) found that life satisfaction does not decline over the majority of adulthood, but there is a steep decline in life satisfaction among those older than 70 [42]. Conversely, the less cognitive and more emotional construct of 'happiness' appears to increase over the complete life span for most, but not all, people. For example, happiness seems to vary considerably by country in later life [43]. In countries such as the United States, United Kingdom, and China happiness increases from about age 50 onward. In Germany happiness only minimally increases from age 65, and in Russia happiness does not increase at all past age 75. Several reasons have been suggested for such differences, such as older adults in some countries having higher levels of emotional regulation [44].

A key reason to focus on wellbeing in later life is because of its strong association with longevity. The well know 'Nun Study' [45] found a strong correlation between being happy and living longer. In this study handwritten autobiographies from 180 Catholic nuns, composed at a mean age of 22 years, were scored for emotional content and related to survival during ages 75 to 95. The study found a strong inverse association between positive emotional content and risk of mortality in late life. For every 1%

increase in the number of positive sentences in their writings, there was a 1.4% decrease in mortality rate, and on average the happiest nuns lived 10 years longer than the least happy nuns.

Beyond emotional traits, cognitive perceptions have also been found to relate to longevity. In one study Levy and colleagues found that in a sample of 660 individuals aged 50 and older, individuals with more positive self-perceptions of aging, measured up to 23 years earlier, lived on average 7.5 years longer than those with less positive self-perceptions of aging [46]. This advantage remained after controlling for age, gender, socioeconomic status, loneliness, and functional health. They also found that this effect is partially mediated by a 'will to live'.

Specific elements that build wellbeing also decline with age. For example, the MIDUS study (Mid Life in the United States) found that a sense of purpose in life decreased substantially for older adults from age 60 to 74, and even more so for females [47]. However, Steger, Oishi and Kashdan (2009) found in a sample of 8,756 individuals (including those over 65) that meaning in life increases as one gets older, pointing to a developmental trajectory difference between the constructs of purpose and meaning, opening up intervention possibilities [48]. Studies such as these suggest that psychology has a constructive role to play in positive aging.

3.2. Wellbeing in Older People Can Be Increased

A meta-analysis of 12 randomized controlled trials of interventions aimed at promoting wellbeing in the general population through behavioral interventions reported a moderate and significant effect size post intervention, and a small but significant effect size between two and ten months follow up [49]. Further, a review by Sutipan, Intarakamhang, and Macaskill (2017) of eight wellbeing interventions using positive psychology techniques with older adults suggested that "they [positive psychology interventions] provide promising tools for enhancing well-being, happiness, life satisfaction and alleviating depressive symptoms in older adults" [50].

Wellbeing interventions have several benefits for older individuals in both clinical and non-clinical populations. These benefits include improved psychological wellbeing [51-55], greater subjective happiness [56-59], improved life satisfaction [53, 54, 56, 58-60], enhanced self-esteem [54, 55, 60], and increased quality of sleep [52, 53]. The same studies found decreases in self-reported feelings of depression and depressive symptoms [53-56, 58, 59], reduced stress [59, 61] and, decreased anxiety [58]. Other benefits of wellbeing interventions with older adults were increased social wellbeing [53], better working memory [51], increases in gratitude [56], and greater overall mindfulness [59].

These wellbeing interventions have been delivered in a range of contexts and delivery modalities, including small groups and one-on-one sessions, and are increasingly being utilised with telehealth solutions, most notably using online formats. Telehealth solutions, being solutions that use information and communications technology to deliver health care and transmit health information [62], are particularly interesting for wellbeing and positive psychology interventions. This is because of their ease of access and ability to scale, and they have, despite several challenges regarding methodology and study quality, generally demonstrated positive effects on wellbeing and depression [63, 64].

Although the scientific field of positive psychology is young, and subsequently the number of studies using telehealth interventions in the older population is currently sparse, promising results are emerging. Online positive psychology interventions

(OPPIs) are characterised by partial or complete online delivery of content where participants are geographically spread and have little to no contact with researchers or professionals delivering the intervention. Many are self-paced and as participants are not in a controlled environment there can be many extraneous variables that impact on the findings of online intervention studies, clouding how effective these interventions may be.

The findings on the efficacy of online interventions are also mixed. A number of studies have reported the positive impact of OPPI's including increased positive emotion and self-efficacy [65], and higher levels of self-reported happiness and a decrease in depressive symptoms [66, 67]. However, two studies have also reported no change in measures of happiness, quality of life, and work performance [68, 69]. A study investigating the impact of OPPIs with older adults found three out of four brief one-week interventions where participants were communicated with online found an increased happiness, and two out of four interventions led to a reduction in depressive symptoms [57]. This study provides initial evidence for the efficacy and feasibility of OPPIs with older adults. However, further research is required to understand when, how, for whom and why OPPIs work.

It is widely accepted that the internet presents new and positive opportunities for the wide dissemination of many different mental health interventions [64], however, caution needs to be taken when investigating the efficacy of these interventions due to the uncontrolled nature with which online interventions are delivered.

3.3. Complete Mental Health

The relationship between mental illness and mental health (or wellbeing) has been a contentious one. Theorists generally considered that mental illness and wellbeing were opposite ends of the same spectrum, and that improvements in wellbeing could prevent an individual from falling into mental illness [70]. As a result, therapists and researchers using positive psychology in their work have operated somewhat independently of those targeting mental illness and clinical populations. More recent insights, in particular the landmark publication by Keyes [71], however points to wellbeing and mental illness as two separate, yet correlated unipolar dimensions. In other words, mental illness and psychological wellbeing are related concepts, but are not two ends of the same spectrum as was previously thought.

This new view has caused increasing focus on blending traditional and positive psychology approaches, such that there is an emerging body of research dedicated specifically to the delivery of wellbeing and positive psychology interventions to individuals with moderate and severe mental illness, most notably depression and anxiety, called both 'positive psychotherapy' and 'positive clinical psychology' [72, 73]. This blend between traditional clinical approaches and the newer positive psychology informed approaches has significant implications for the health care system, as wellbeing interventions can be delivered across the spectrum of mental illness, from the well population, through to individuals with mild, moderate and severe mental illness [74].

Keyes' (2005) work resulted in the Complete State Model of Mental Health (CSM), depicted in Figure 1 below, which states that an individual has 'complete mental health' when they have both a low level of mental illness *and* a high level of wellbeing [71].

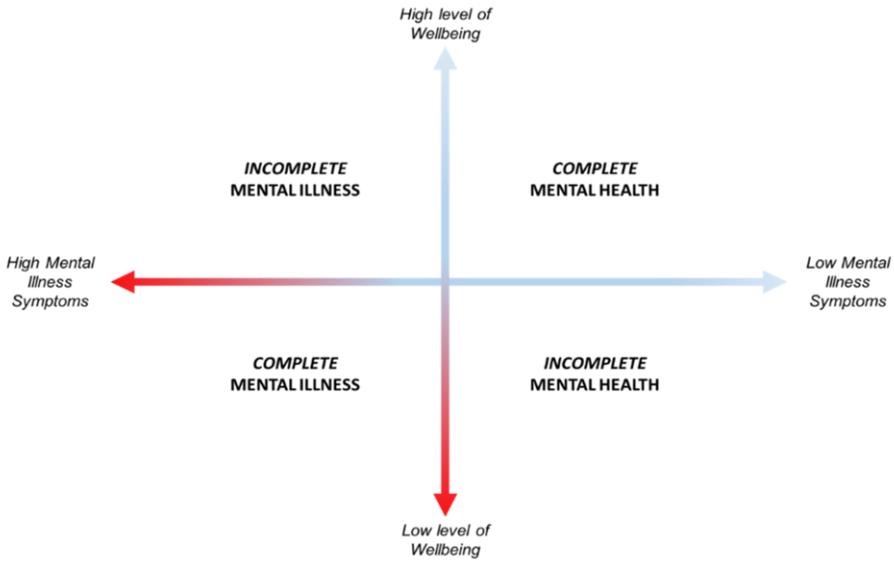


Figure 1: Representation of the Complete State Model of Mental Health, adapted from Slade (2010).

A key application of the CSM is that it reveals ‘invisible’ sub-groups within a population, which are likely to require, respond to, and benefit from vastly different intervention approaches. Keyes (2007) identified six sub-groups, those with or without clinical mental illness with either high (flourishing), moderate, or low (languishing) levels of wellbeing on the wellbeing continuum [75]. The CSM has the potential to provide a clearer and more comprehensive snapshot of a population’s mental health, with evidence supporting the benefits of flourishing without mental disorders for both individuals and society [75].

Taking the CSM as a reference point, a ‘Complete Mental Health profile’ of South Australia can be formed by analyzing data stemming from a sample of 1,210 South Australians collected in the South Australian Monitoring and Surveillance System (SAMSS) [76], displayed in Figure 2, with descriptive statistics split for the six sub-groups identified by Keyes in 2007 provided in Table 1. SAMSS has been collected monthly since 2002 using randomized South Australian residential telephone numbers and the Computer Assisted Telephone Interview system. These data presented in Figure 2 were collected in 2014.

This survey included four wellbeing questions developed by the Office for National Statistics (UK) that form a composite quantification of wellbeing, and scores on the Kessler Psychological Distress Scale (K10)[77] that form the score representing mental illness. The axes representing the divide between low and high mental illness and wellbeing, similar to those presented in the original CSM by Keyes, are formed by the median scores for both measures.

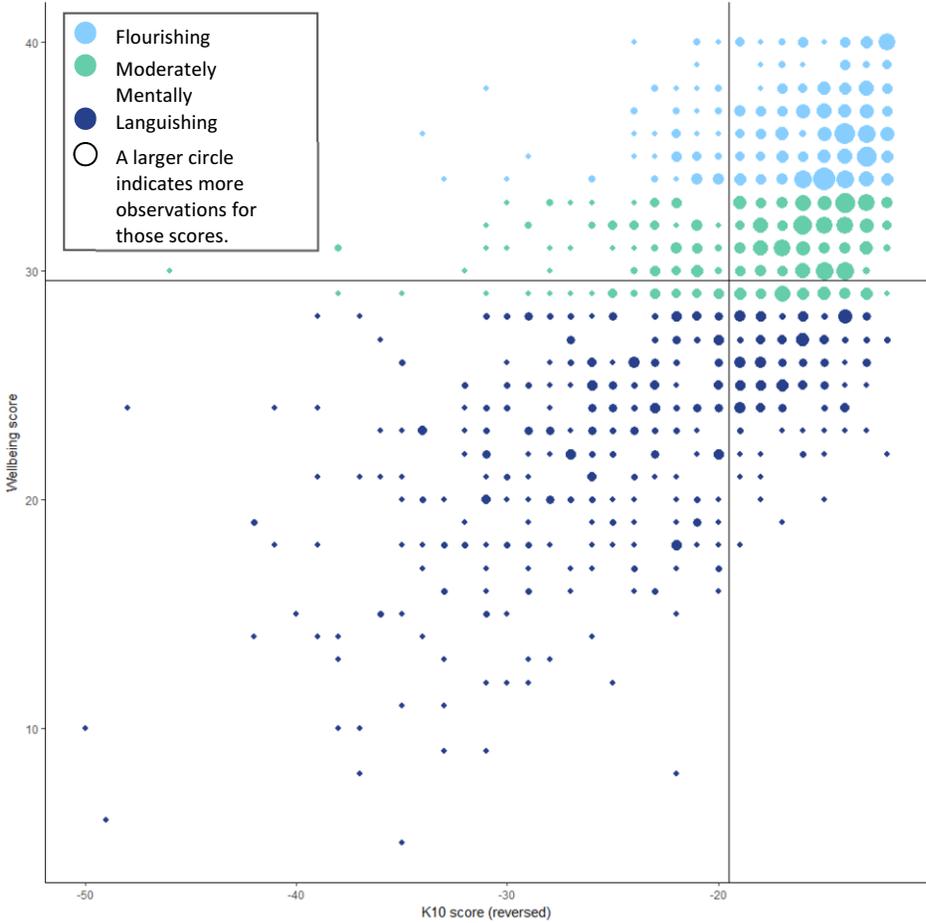


Figure 2. Complete mental health in a sample of South Australians.

The CSM could have significant implications for healthy ageing and efforts to improve the mental health of ageing populations around the world. Table 1 for instance indicates that older South Australians (65 years or older) are performing differently to the rest of the population with respect to the CSM, with results indicating higher percentages of older people in the extreme categories. These insights provided by the CSM grid are valuable for governments and health professionals in order to better understand the mental health (treatment) requirements of older citizens. This information could be used to more accurately and efficiently allocate resources and set policy priorities in relation to the mental health of older individuals, and could also be used to provide important insights for health professionals to determine what treatment options to recommend. For example, using a positive psychology based telehealth solution to help someone who shows mild mood symptoms and demonstrates moderate wellbeing, whereas deciding to recommend face-to-face cognitive-behavioural or acceptance-commitment therapy combined with in-person wellbeing training for those who are languishing and severely depressed.

Table 1. Prevalence of Flourishing in a sample of 1,210 South Australians

Group	Prevalence (%)
Total	
Mental Illness and Languishing	26%
Mental Illness and Moderately Mentally Healthy	7%
Mental Illness and Flourishing	6%
Languishing (and no mental illness)	12%
Moderate Mental Health (and no mental illness)	18%
Complete Mental Health (Flourishing, no mental illness)	32%
Under 65	
Mental Illness and Languishing	20%
Mental Illness and Moderately Mentally Healthy	7%
Mental Illness and Flourishing	5%
Languishing (and no mental illness)	13%
Moderate Mental Health (and no mental illness)	18%
Complete Mental Health (Flourishing, no mental illness)	30%
Over 65	
Mental Illness and Languishing	24%
Mental Illness and Moderately Mentally Healthy	7%
Mental Illness and Flourishing	7%
Languishing (and no mental illness)	9%
Moderate Mental Health (and no mental illness)	16%
Complete Mental Health (Flourishing, no mental illness)	38%

Note: Percentages refer to Figure 1

Currently however, a purpose-built assessment tool for measuring CSM does not yet exist. The WRC is beginning to develop an assessment methodology that will include measures of mental illness and wellbeing, as well as physiological factors that are related to mental health (e.g., physical activity, nutrition, sleep), demographics, social determinants of health, and receptivity or interest in various wellbeing intervention types. An assessment tool such as this could be used to categorise individuals according to their CSM status, with the aim to produce an evidence-base that will facilitate the acceptance of wellbeing interventions into the mental health care system. This will provide a novel level of sophistication to pair individuals with the services they are receptive to and be most likely to improve their implicit capacity.

4. Telehealth, Healthy Ageing, and the Complete State Model of Mental Health

Telehealth has been promoted as a cost-effective initiative to combat the rising economic pressure of ageing populations [78], with common telehealth initiatives including remote consultation with health care providers, sharing electronic medical records to manage chronic diseases or medications, or for monitoring and transmitting data on relevant indicators to health providers or family members [79]. To support healthy ageing, wellbeing telehealth should be targeted across the board; to older adults themselves, their relatives and carers, and their professional health providers, however ensuring concerns regarding quality of service and agency are met [78].

The WRC is developing an online platform that has been designed primarily to allow Australians to freely measure their level of psychological wellbeing and some

elements of mental illness symptomology, and receive individualised feedback on their wellbeing. The feedback will also include recommendations on ways to improve their wellbeing. We envision including the complete mental health assessment battery into online measurements.

There are a range of impacts that this type of technology could have on healthy ageing, for individuals and governments alike. The most obvious impact of this technology is the provision of real-time insights for older adults to learn about their mental health status, with targeted recommendations for the services most likely to help. Research indicates that older adults under-identify their level of mental illness, therefore an objective report of their complete mental health could provide the stimulus and suggest potential pathways to seek help if it is required. By including measures in the assessment battery such as social connectedness, physical activity, nutrition, and sleep, these reports could include telehealth interventions or other services to address the underlying causes of mental illness or low wellbeing, rather than merely addressing the symptoms. These interventions could range from low-intensity, evidence-based online wellbeing interventions, or mental health services or group sessions, to higher-intensity interventions or specialised care for individuals with more complex presentations and needs. With consent, this data could be shared with General Practitioners or health professionals, who could further support their patients through these interventions or services (e.g., proactively identifying relapse), and improve their relationship with their patients.

This assessment platform could also be ‘evidence-generating’ if older adults complete the measurement regularly, in addition to participating in interventions or services. This capability has important implications for the health care system, as it can inform mental health and Medicare reform agendas [80], as well as developing deeper understandings of the CSM.

In addition to improving the implicit capacity of older adults, wellbeing telehealth can also be used to improve the environments in which they live. We anticipate that large Australian samples will participate in this online platform, which would allow the WRC to accurately and efficiently report the epidemiology of mental health and wellbeing anonymously (i.e., deidentified) to the Government, to inform allocation of resources to high need areas, establish accurate health priorities, or evaluate the impact of new policies on mental health.

Finally, this telehealth approach may attract the ‘missing middle’ demographic of Australians who are traditionally overlooked by mental health services. This demographic is important for healthy ageing as they represent the next generation of older people. By flying under the radar of the mental health services, they may potentially worsen or present chronic undiagnosed mental illness at older ages. Therefore, this platform may support the prevention aspects prioritised by healthy ageing.

5. Conclusion

Increasing longevity globally presents an opportunity to learn about what constitutes a full and productive life in older adulthood. Older adults are at increased risk of mental and physical health issues, but evidence suggesting that this is not the norm and that wellbeing interventions, with the wide range of benefits they confer, are effective in building mental and physical health assets with older populations. This chapter has suggested that an online platform to measure the Complete Mental Health of individuals

will deliver a wide range of benefits to the broader community, as well as the individual themselves. These benefits include the accurate diagnosis of mental illness and wellbeing, helping to remove the stigma of mental illness, assisting older adults to understand the link between mental health and ageing, providing data to drive informed policy decisions around mental health service provision, and enabling GPs to provide low cost, less severe treatment options for patients with mild mental health concerns. The WRC wellbeing platform will be foundational for continued research and a deeper understanding of wellbeing and mental health in Australia, and through this understanding it will support better treatment and intervention strategies for older adults affected by mental illness.

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